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The Effect of Yoga in Reducing Pain Related to Arthritis: An Integrative Review of the Literature

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Abstract

Research shows that arthritis is the most common cause of disability in the United States (Middleton et al., 2013). The PICOT question for this systematic review of literature is "In adults over the age of 40 years, how do yoga interventions, compared to pharmacological pain relief methods alone, affect arthritic pain intensity and frequency?" This systematic review will discuss the possible benefits of using yoga as treatment for both rheumatoid arthritis and osteoarthritis. The methods for this review included a comprehensive search yielding nineteen credible studies using the databases Search-A-Roo, Google Scholar, and CINAHL Plus for full-text academic journal articles containing studies discussing the use of yoga for adult patients with arthritic conditions.

Introduction

Rheumatoid arthritis (RA) is an autoimmune, chronic inflammatory disorder that causes pain, swelling, stiffness, and loss of joint function (Stewart, 2013). Osteoarthritis (OA) is the most common form of arthritis and is a chronic condition characterized by a breakdown cartilage in the joints (Park, McCaffrey, Newman, Cheung, & Hagen, 2014). According to the Centers for Disease Control and Prevention (CDC), arthritis is a condition that includes more than 100 rheumatic diseases and conditions that affect joints, the tissue that surrounds the joint, and other connective tissue. Common symptoms of arthritis disease include joint swelling, joint pain, stiffness in or near joints, and decreased range of motion, which may affect functionality and quality of life (U.S. Department of Health and Human Services, Center for Disease Control and Prevention, 2016). Symptoms may come and go, being manageable at some times and then extremely painful and difficult to deal with other times. Arthritis can cause permanent joint changes over time, which can cause chronic and excruciating pain and is the leading cause of disability in America, affecting nearly 50 million (approximately one in five) adults in the United States (LeMone & Burke, 2008).

Typically, arthritis is managed with analgesics (pain-relieving medications) and non-steroidal anti-inflammatory drugs (NSAIDs). However, NSAIDs can cause side effects ranging from stomach irritation to increasing the risk of heart attack or stroke (U.S. Department of Health and Human Services, Center for Disease Control and Prevention, 2016). Other medications used to treat arthritis include corticosteroids, which may suppress the immune system resulting in an increased risk of other acquiring other diseases. These side effects can be especially detrimental in older adults, who have a lower ability to fight off infection and illness due to age. The advantage of using medications to treat arthritis is that it’s easy and may not require any extra

effort from the patient. However, medications can cause side effects that can be uncomfortable, expensive, or worsen other conditions in the body. A prominent issue in healthcare remains patients' nonadherence to pharmacological regimens to treat illnesses and physical conditions; there may be a fear of becoming too dependent on pharmacological interventions to live a normal life free from pain, discomfort, and ADL (activities of daily living) limitation. ADLs are activities that are usually completed without needing assistance, like eating, dressing, bathing, and walking. Although medications may be used to treat pain, there is potential to experience side effects from the medications. Advantages of using non-pharmacological methods of treatment to decrease symptoms of arthritis include lack of side effects and cost-effectiveness.

Yoga is an ancient Indian practice which focuses on the origin of diseases. Because of its ancient origins, this practice has varied little since its beginnings. Yoga incorporates various movement, postures, breathing, and meditation techniques and has been studied by researchers who have found that use of yoga reduces blood pressure, stress, and pain in adults with arthritis. According to Nagarathna, Nagendra, Ebnezar, and Yogitha (2012), yoga therapy showed reduction in pain and functional disability with improved strength, balance, and gait. This systematic review aims to confirm or deny whether current research and literature supports that yoga practice is a useful intervention in reducing pain in arthritic adults.

Methods

Nineteen articles were retrieved using the following databases and search engines: (1) Search-A-Roo (via The University of Akron's online library); (2) Google Scholar; (3) Wolters Kluwer's Ovid search engine; (4) MEDLINE Plus; and (5) CINAHL Plus. All 19 articles are from peer-reviewed, scholarly journals. Keywords used to search the databases, in combination with each other or on their own, included: (1) "yoga;" (2) "arthritis"; (3) "Rheumatoid arthritis";

(4) “osteoarthritis”; and (5) “pain management,”. When conducting this systematic search, publications were identified and then inclusion and exclusion criteria were used to extract the most relevant research to answer the PICOT question. Inclusion criteria included articles being published between the years of 1998 and 2018, a variety of samples of both genders, samples including adults over the age of 18 only, and publications accessed without cost. This systematic review recognized that studies published between 2013 and 2018 are the most relevant; however, the search was expanded to 1998 in order to reach a valid sample size. Exclusion criteria included studies with samples of children and adolescents under the age of 18. All of these criteria were set to assure the studies included in this systematic review would help to answer the PICOT question: “In adults over the age of 40 years, how do yoga interventions, compared to pharmacological pain relief methods alone, affect arthritic pain intensity and frequency?”

After extracting publications about yoga, arthritis, and other rheumatic conditions like osteoarthritis and rheumatoid arthritis, a Table of Evidence (**Appendix A**) was completed, which is a tool for detailing each study reviewed, specifying research objectives outlined by the researchers, methods used in the study, and research design. The table of evidence also identifies each study’s findings, what the implications of these findings are, and any limitations to that particular study. Publications were selected based on quality, year published, and lack of bias. For example, no studies were selected if they were performed by groups that may be biased towards specific results, (i.e. organizations who promote the practice of yoga like yoga studios and pharmaceutical companies that manufacture arthritis medication like NSAIDs and analgesics). Avoiding bias in selection is a key element to assuring that the systematic review is valid. Articles that were proposed studies or included incomplete research were not included in this systematic review.

Review of Literature

The collection of 19 studies within this systematic review includes a broad range of genders, ethnicities, and ages above 18 years old. Of these 19 studies, six of them focused specifically on patients with rheumatoid arthritis (RA), seven of them focused on patients with osteoarthritis, and six of them simply discussed arthritis in general. The breakdown of The 19 studies also used different forms and practices of yoga on their participants; one study used Raj Yoga, three studies used Hatha Yoga, one study implemented the use of Kundalini Yoga, one study used "Sit 'N' Fit" Chair Yoga, and 13 studies used general yoga on their participants. The breakdown of these study characteristics and methods can be found in **Table 1** and **Table 2**.

Table 1: Types of Yoga Methods and Number
of Research Studies Utilizing That Yoga Method

Type of Yoga Interventions	**Number of Studies**
Raj Yoga	One
Hatha Yoga	Three
Kundalini Yoga	One
Sit N Fit Yoga	One
General Yoga Practice	Thirteen

Table 2: Types of Arthritis and Number of Research Studies Examining that Specific Type

Type of Arthritis	**Number of Studies**
Osteoarthritis (OA)	Six
Rheumatoid Arthritis (RA)	Eight
General, nonspecific Arthritis	Five

General yoga is a nonspecific practice, including a variety of movements, positions, and varieties of meditation, spanning multiple methods of practice like Raj and Hatha yoga. Raj yoga focuses on eight steps of practice, ranging from self-control to discipline, with only one step (Asana) including physical practice. Hatha yoga practice is incredibly similar to general yoga practice as it encompasses most yoga styles and has equal parts Asana (physical practice) and Pranayama (breathing exercises).

This study included Hatha yoga and generalized practice as two separate categories of practice because studies specifically named the types of practice. Kundalini yoga focuses on inner energy, specifically "female" energy, and the release of it through chanting, breathings, and Asana. Sit N Fit yoga is a method of stationary yoga, focused on small movements similar to Range of Motion (ROM) movements. It is aimed at the elderly population and those who are less capable of more advanced movements often required in standard yoga practice. It often involves sitting or lying down, so that the participant's energy can be focused on arm and leg movements. This systematic review includes multiple types of yoga practice because while some small

differences between types of practice are present, all are interventions involving flowing movements, breathing, meditation, flexibility, and balance.

Yoga and Rheumatoid Arthritis

Of the eight studies that focused on RA, six of them supported the use of yoga to relieve symptoms of RA either alone or in conjunction with traditional pharmacological methods while two studies found little to no improvement. One study, conducted by Badsha, Chhabra, Leibman, Mofti, and Kong (2009), found that a bi-weekly Raj Yoga program showed significant improvement in 47 patients selected from a RA database. In this study, 26 patients partook in yoga while the other 21 were part of the control group. The yoga group attended 12 sessions of yoga while the control group did not. However, a study conducted by Cramer, Lauche, Langhorst, and Dobos (2009) found that yoga did not seem to show a significant improvement in symptoms of RA.

Yoga and Osteoarthritis

Of the seven studies that primarily focused on those suffering from symptoms of OA, six of them found various forms of yoga to be useful in reducing pain and inflammation. However, there was one study that found no significant improvement between the experimental group and the control group. Park, McCaffrey, Newman, Cheung, and Hagen (2014) split a group of 29 participants with OA into two groups; an experimental group and a control group. The experimental group attended an eight-week course of Sit ‘N’ Fit Chair Yoga and was assessed at the end of the course to see whether or not their OA symptoms were relieved. At the end of the study, it was concluded that the participants did not show significant improvement of symptoms when compared with the control group.

Yoga and Nonspecific Arthritis

The studies that discussed general, nonspecific arthritis generally agreed that yoga can be useful for treating symptoms of arthritis in conjunction with pharmacological methods. Of the five studies, four of them supported the use of yoga while one of them concluded that there was not enough data to support the use of yoga in general, nonspecific arthritis. Sharma (2005) studied 15 people aged 45-66, afflicted with nonspecific arthritis, that attended a six-week course of Kundalini Yoga. Upon evaluation at the end of the course, this study concluded that there is limited support regarding the usefulness of yoga in patients with arthritis.

Critical Appraisal and Synthesis of the Evidence

This systematic review evaluated 19 studies, with 2,368 participants total. This systematic review broke down the findings and results of these studies into three categories: (1) shows significant evidence supporting yoga as an intervention for arthritis; (2) weak evidence supporting yoga as an intervention for arthritis; and (3) no evidence supporting yoga as an intervention for arthritis. **Table 3** includes the breakdown of the 19 articles according to these categories. Articles that found significant evidence supporting yoga as an intervention for arthritis found in their studies that the majority of their subjects found significant relief from practicing yoga. One study conducted in Dubai selected 47 participants from a Rheumatoid Arthritis database and had 26 of them partake in yoga while the other 21 acted as the control group. This study concluded that the 26 participants found significant improvement in their RA symptoms (Badsha, Chhabra, Leibman, Motfi, & Kong, 2009). Another study that found significant improvement selected 36 community dwelling women with Osteoarthritis and divided them into an experimental group and a control group; this study concluded that those women in the experimental group found significant improvement in their OA symptoms compared to the control group (Cheung, Wyman, Resnick, & Savik, 2014).

Table 3: Results of Research Studies

Evidence	Number of Studies
(1) Significant evidence supporting yoga as an intervention for adults with arthritis	Ten
(2) Weak evidence supporting yoga as an intervention for adults with arthritis	Seven
(3) No evidence supporting yoga as an intervention for adults with arthritis	Two

Although the majority of the journal discussed in this systematic review found significant improvement in symptoms of arthritis after practicing yoga, there were seven articles that found weak evidence supporting yoga as an appropriate intervention for arthritic symptoms. One study selected 15 subjects with arthritis and had them complete a six-week long yoga course and, afterward, surveyed the participants on their results. This study concluded that there was limited support regarding the feasibility of yoga for arthritic patients (Sharma, 2005). Two studies included in this systematic review found that there is virtually no evidence to support the use of yoga for people with arthritis. One study involved 29 volunteer osteoarthritic participants that attended a Sit 'N' Fit Chair Yoga course at a senior center. Upon review, this study found that the participants reported little to no improvement in their arthritic symptoms after the program (McCaffrey, Newman, Cheung, & Hagen, 2014).

Although study limitations weaken the results and findings of the study, they serve to strengthen future research and, therefore, professional practice. There were some studies in this systematic review having limitations that included small, inadequate sample sizes and lack of randomization of participant selection. For example, the study conducted by Telles, Naveen, Gaur, and Balkrishna (2011) had no control group and the 64 participants were self-selected volunteers. Therefore, the results displayed from the experimental group cannot be compared to another group of individuals that did not receive the intervention. Furthermore, the lack of randomization in participants weakens the study because the

participants volunteered, and therefore may be more active and driven to decrease arthritis-related pain than the average adult with arthritis. This makes generalizability of results to the population as a whole difficult. One study that had a smaller sample size was the study conducted by Hansen (2010) where 23 arthritic participants volunteered to participate in a two-month long yoga course. Although this study found that yoga was helpful for these 23 participants' arthritic symptoms, the sample size is so small that it is not as strong of evidence as larger studies.

Methods of research included in this systematic review included home practice and group practice. Group classes were held in healthcare facilities such as nursing homes and in athletic centers, while home practice was encouraged and included as part of the interventions. A limitation here is that home practice may include decreased patient adherence. There is a lot of independence in home yoga practice potentially resulting in a decrease in patient participation which may play a negative role in study findings. In Stewart's 2013 study, participants completed assessment based, tailored home practices modified to address participant identified goals. Although these practices were tailored to each individual person, each exercise was performed at home without supervision and, therefore, cannot be proven to be truly completed.

Conclusion and Recommendations

The current state of science based on the evidence presented in the 19 studies included in this systematic review supports using yoga interventions as a supplemental intervention for adults with arthritis. Although, a majority of the studies showed some level of improvement in arthritis symptoms, specifically pain, when yoga was used as an intervention. However, the benefits were often considered to be weak. There were no studies that found that yoga interventions had a negative effect on pain related to arthritis, meaning that it never increased pain or worsened symptoms. Therefore, this review encourages the use of yoga as a supplement to pharmacological methods of treatment and exercise.

This systematic review is prepared to make recommendations for future research and individual studies based on the limitations of studies included in this review. Based on the analysis of 19 studies, both limitations and strengths were identified in the evidence currently available surrounding yoga and its use for combating pain related to arthritis. It is recommended that future studies strive to avoid similar limitations to strengthen their findings, therefore strengthening the evidence. It is recommended that future research studies should include the following suggestions

- utilize large sample sizes to add validity to results as a larger sample size allows for the results to better be generalized to larger populations and improve validity;
- include longitudinal analysis of study participants to speak to the long-term effects of interventions examined;
- use of equal participants within the sample, specifically for gender (i.e. similar number of men compared with women);
- provide a method to encourage and/or assure patient adherence involved in home practice yoga interventions such as through home monitoring, journal-keeping, or home visits by member(s) of the research team;
- ensure accessibility to interventions to help increase adherence to interventions.

This systematic review of current literature evaluated yoga practice and its effect on pain related to arthritis. Through an examination of 19 studies conducted by researchers and institutions, no conclusion was able to be reached as to the use of yoga as the single method of pain management. Because of the lack of longitudinal studies, no study was able to draw conclusions as to the long-term effectiveness of yoga to relieve arthritis symptoms, namely pain.

This systematic review suggests that yoga practice be used in conjunction with other methods of pain management, such as pharmacological methods (NSAIDs, etc.); the use of yoga to relieve pain related to arthritis was not shown by any study to worsen pain or exacerbate symptoms.

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Bosch, Traustadóttir, Howard, & Matt (2009). Functional and physiological effects of yoga in women with rheumatoid arthritis: A pilot study. *Alternative Therapies, 15*(4), 24-31.

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Middleton, K. R., Ward, M. M., Haaz, S., Velummylum, S., Fike, A., Acevedo, A. T., . . . Wallen, G. R. (2013). A pilot study of yoga as self-care for arthritis in minority communities. *Health and Quality of Life Outcomes,11*(1). doi:10.1186/1477-7525-11-55

Moonaz, S. H., Bingham, C. O., Wissow, L., & Bartlett, S. J. (2015). Yoga in sedentary adults with arthritis: Effects of a randomized controlled pragmatic trial. *The Journal of Rheumatology, 42*(7), 1194-1202. doi:10.3899/jrheum.141129

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Appendix A: Table of Evidence

Cited Reference	**Purpose Statement & Research Question**	**Clinical Practice Setting, Sampling Methods, Sample Size**	**Design**	**Find-ings, Conclu-sions**	**Implications**	**Limitations**
Badsha, H., Chhabra, V., Leibman, C., Mofti, A., & Kong, K. O. (2009). The benefits of yoga for rheumatoid arthritis: Results of a preliminary, structured 8-week program. *Rheumatology International*, *29*(12), 1417-1421. doi:10.1007/s00296-009-0871-1	Purpose: to measure the significance of a bi-weekly Raj yoga program on the symptoms of RA. RQ: What is the significance of a bi-weekly Raj yoga program on the symptoms of RA?	47 participants were recruited from an RA database of patients. This study took place in Dubai, India.	Design: 26 patients partook in yoga while the other 21 were part of the control group. The yoga group attended 12 sessions of yoga.	This study found significant improvemen t in the participants who took part in the yoga group.	One could use this in the clinical setting to suggest yoga as a treatment method for relieving RA symptoms	Small sample size of 47, inability to blind rheumatologi sts to the intervention.

Büssing, A., Ostermann, T., Lüdtke, R., & Michalsen, A. (2012). Effects of Yoga Interventions on Pain and Pain-Associated Disability: A Meta-Analysis. *The Journal of Pain, 13*(1), 1-9. doi:10.1016/j.jpain.2011.10.001	Purpose: to determine whether or not yoga serves as a useful supplementary approach to treatment for pain associated disabilities RQ: Does yoga serve as a useful supplementary approach to treatment for pain associated disabilities?	16 total studies were examined, two of which were specifically discussing RA.	Design: only selected quality clinical studies on the reduction of pain related to yoga. Used many databases to do so.	This meta-analysis suggests that yoga is a useful supplementary approach with moderate effect sizes on pain and associated disability.	Since RA is a pain related disability and was studies in this meta-analysis, one could use this as a resource to inform RA patients on how yoga could help reduce their pain levels.	Small number of clinical studies were analyzed, some studies were of moderate or low quality.

Cheung, C., Wyman, J. F., McCarthy, T., Rudser, K., Mathiason, M. A., & Bronas, U. (n.d). Managing knee osteoarthritis with yoga or aerobic/strengthening exercise programs in older adults: a pilot randomized controlled trial. *Rheumatology International*, *37*(3), 389-398.	Purpose: This study compared the effects of Hatha yoga (HY) and aerobic/strengthen-ing exercises (ASE) on knee OA. RQ: Is Hatha yoga (HY) a useful exercise method to decrease fear of falling/anxiety on adults with knee OA?	Randomized controlled trial of 83 participants.	Three arms design were used: HY, ASE, and education control. Both HY and ASE groups involved 8 weekly classes with 2–4 days/ week home practice sessions. Data on OA-related out-comes were collected at baseline, 4 weeks, and 8 weeks post-randomizatio n.	Compared to participants in the ASE group and the education control group at 8 weeks, participants in the HY group had greater symptom improve-ment.	The greater beneficial effect of yoga on OA symptoms than traditionally recom-mended ASE may be related its use of meditative practices and how they affect the perception of pain.	The sample size is slightly below the expected level Second, because the majority of the sample was comprised of Caucasian and well-educated women, the sample limited the generalizabili ty of findings. Participants were self-selected volunteers; they may be more active/ motivated than the typical older adults with knee OA.

Cheung, C., Wyman, J. F., Resnick, B., & Savik, K. (2014). Yoga for managing knee osteoarthritis in older women: A pilot randomized controlled trial. *BMC Complementary and Alternative Medicine BMC Complement Altern Med, 14*(1). doi:10.1186/1472-6882-14-160	Purpose: to determine the effectiveness of hatha yoga on decreasing pain in older women with OA of the knee. RQ: How effective is hatha yoga on decreasing pain in older women with RA of the knee?	36 community dwelling women were randomly selected and divided evenly into an experimental and a control group.	Design: The yoga group participated in an 8-week yoga program involving group and home-based sessions	The yoga appeared to produce a significant improvement in overall pain scores.	This study could be used in EBP to suggest to older women with RA that they try yoga to decrease their pain levels.	Smaller sample size, did not measure accurate long term effects
Cramer, H., Lauche, R., Langhorst, J., & Dobos, G. (2013). Yoga for rheumatic diseases: A systematic review. *Rheumatology, 52*(11), 2025-2030. doi:10.1093/rheumatology/ket264	Purpose: To determine the effectiveness of yoga as an intervention to relieves the symptoms of rheumatic diseases.	Randomized controlled trials and randomized crossover studies were eligible for examination. The subjects in these studies suffered from some form of rheumatic disease.	The authors of this systematic review looked at studies dealing with yoga and some form of RA or OA.	Based on the results of the studies, this review concluded that there was a weak effect of yoga on relieving symptoms of RA or OA.	This SR could be used to argue that yoga does not really aid much with RA and could be used as a reference as to why people should try other methods instead.	There was a relatively low number of RCts reviewed and the quality of these studies were not high.

Dash, M., & Telles, S. (2001). Improvement in hand grip strength in normal volunteers and rheumatoid arthritis patients following yoga training. *Indian Journal of Physiology and Pharmacology, 45*(3), 355-360.	Purpose: Assessing the effects of a set of yoga practices on normal adults (n=37), children (n=86), and patients with rheumatoid arthritis (n=20).	143 Participants (37 normal adults, 86 children and 20 people with RA) were selected for this randomized controlled trial.	Design: The three categories of subjects received yoga for varying periods based on the yoga camp they were attending. During these periods of yoga practice, an equal number of "control" subjects of comparable age and sex were studied at the beginning and end of a period during which they did not practice yoga, but carried on with their	Subjects of all three categories (i.e., adult and child volunteers and adult patients with rheumatoid arthritis) showed significant increases in hand grip strength following yoga. The control group, who did not practice yoga showed no change.	This study could argue that yoga improves hand grip strength in those with rheumatoid arthritis.	This was a relatively short study only spanning 3 months, therefore it does not show the long term effects of yoga.

			routine activities.			

Ebnezar, J., Bali, Y., Nagarathna, R., & Nagendra, H. (2011). Effect of an integrated approach of yoga therapy on quality of life in osteoarthritis of the knee joint: A randomized control study. *International Journal of Yoga, 4*(2), 55. doi:10.4103/0973-6131.85486	Purpose: to evaluate how effective the addition of yoga therapy to therapeutic exercises in osteoarthritis is. RQ: How effective is the addition of yoga to therapeutic exercises in those with osteoarthritis?	225 people between the ages of 35 and 80 were selected for this randomized controlled trial. This took place in Bengaluru, India.	Design; Participants were randomly assigned to receive yoga or physiotherapy exercises after transcutaneous electrical stimulation and ultrasound treatment of the affected knee joints Both groups practiced supervised intervention (40 min per day) for 2 weeks (6 days per week) with followup for 3 months.	The group that received yoga interventions showed significant improvement.	The results of this study show that yoga could possibly improve the well being of people with OA and could be prescribed as a form of exercise to relieve OA symptoms.	The follow up for this study was under 12 months so the long term effectiveness of yoga on OA was not accurately measured

Functional and Physiological Effects of Yoga in women with Rheumatoid Arthritis: A Pilot Study. (2009, July/August). *Alternative Therapies, 15*(4), 24-31. Retrieved October 30, 2016.	Purpose: to determine if the physical function of post-menopausal women with RA can be improved with the use of yoga RQ: Can the physical function of post-menopausal women with RA be improved with the use of yoga?	Sixteen postmenopausal women with RA served as either participants or controls. They volunteered.	Design: The study group participated in three 75-minute yoga classes a week over a 10-week period. The control group was offered standard care.	There was a decreased sense of both pain and depression	One could use this to suggest to post-menopausal women that yoga may be an effective way to decrease pain related to RA.	Small sample size, did not measure results long term.

Hansen, E. (2010, October 1). Yoga for Seniors with Arthritis: A Pilot Study. *International Journal of Yoga Therapy*, 55-60.	Purpose Statement: to assess whether yoga classes could reduce levels of pain, etc in seniors with osteoarthritis RQ: does yoga practice relieves arthritis symptoms in seniors?	Setting: East Harlem, New York City between 9/14/2009 and 11/23/2009 Sampling method: random sampling via flyers distributed offering yoga classes Sample size: 23 students, ages between 46 and 84	Design: one group of 23 students attended yoga classes for about 2 months with their pain, stiffness, and sleeplessness being surveyed at beginning and end.	Analysis revealed significant improvement in pain and stiffness, with no significant effect on sleeplessness Promising evidence that yoga classes can reduce symptoms of arthritis	This pilot study could lead to the a patient deciding to use yoga to decrease stiffness and pain brought on by arthritis	Limited to one community and one yoga studio; lack of convenience and accessibility to others in population; cannot be generalized

Kolasinski, S. L., Garfinkel, M., Tsai, A. G., Matz, W., Dyke, A. V., & Schumacher, H. R. (2005). Iyengar Yoga for Treating Symptoms of Osteoarthritis of the Knees: A Pilot Study. *The Journal of Alternative and Complementary Medicine, 11*(4), 689-693. doi:10.1089/acm.2005.11.689	Purpose: to assess the effectiveness of non-pharmacological interventions, namely yoga, on the relief of symptoms of OA of the knee. RQ: Does yoga provide relief of symptoms of OA of the knee?	Eleven subjects enrolled and nine attended at least one session. Seven attended at least five classes and had data from pre- and postcourse time points available for analysis. It was conducted by the University of Pennsylvania School of Medicine.	Design: Participants were instructed in modified Iyengar yoga postures during 90-minute classes once weekly for 8 weeks.	Significant reductions in pain were observed in the participants	This could be used in the clinical setting to suggest yoga as a non-pharmacological alternative to medicine for the treatment of OA of the knee.	Extremely small sample size.

Middleton, K. R., López, M. M., Moonaz, S. H., Tataw-Ayuketah, G., Ward, M. M., & Wallen, G. R. (2017). A qualitative approach exploring the acceptability of yoga for minorities living with arthritis: 'Where are the people who look like me?'. *Complementary Therapies in Medicine, 31*, 82-89. doi:10.1016/j.ctim.2017.02.006	Purpose: To examine the acceptability of yoga research tailored to recruit and retain a minority population (both English and Spanish speaking) with arthritis.	Twelve participants with osteoarthritis or rheumatoid arthritis in the Washington D.C. area	Design: : Acceptability was evaluated using retention, adherence, journals, and semi-structured exit interviews from twelve participants with osteoarthritis or rheumatoid arthritis undergoing an 8-week yoga intervention.	Exit interview responses showed 94% viewed yoga as a way to care for their arthritis symptoms. Most agreed that the yoga poses work well for people with arthritis.	This study could be used to argue that yoga has been shown to improve arthritis symptoms.	Extremely small sample size of 12 people without a control group.

Middleton, K. R., Ward, M. M., Haaz, S., Velummylum, S., Fike, A., Acevedo, A. T., . . . Wallen, G. R. (2013). A pilot study of yoga as self-care for arthritis in minority communities. *Health and Quality of Life Outcomes Health Qual Life Outcomes,11*(1), 55. doi:10.1186/1477-7525-11-55	Purpose statement: to assess whether or not yoga was an effective method of self-care for arthritis RQ: Does yoga serve as an effective self-help tool for arthritis?	Recruited from English speaking or Spanish-speaking patients receiving care from the NIAMS rheumatology practice located in Silver Spring, Maryland, a racially diverse area in the Washington DC metro region. -The study follows 20 participants over an 8-week series of yoga classes.	Design: participants asked to attend yoga classes and, afterwards, fill out a questionnaire on how they felt	Taking yoga classes helps to improve measures of physical health, flexibility, balance, affect, and pain symptoms as well as reduces measures of depression	One could use this to suggest yoga as a suggestion for treating arthritis with less medication	Limited to the specific population of a minority community in ME.

Moonaz, S. H., Bingham, C. O., Wissow, L., & Bartlett, S. J. (2015). Yoga in Sedentary Adults with Arthritis: Effects of a Randomized Controlled Pragmatic Trial. *The Journal of Rheumatology*, *42*(7), 1194-1202. doi:10.3899/jrheum.141129	Purpose: To evaluate the impact of Integral-based hatha yoga in sedentary people with arthritis. RQ: What effect does hatha yoga have on sedentary people with arthritis?	75 sedentary adults aged 18+ with rheumatoid arthritis (RA) or knee osteoarthritis (OA) were selected	Participants took part in 8 weeks of yoga (two 60 min classes and 1 home practice/wk)	Preliminary evidence suggests yoga classes may help sedentary individuals with arthritis increase physical health and decrease pain	Could use this to aid people who are sedentary with arthritis to decrease their pain and increase their physical health.	There was not a control group. There was no way to ensure subjects participated in at-home practice.
Nagarathna, R., Nagendra, H., Ebnezar, J., & Yogitha, B. (2012). Effect of integrated yoga therapy on pain, morning stiffness and anxiety in osteoarthritis of the knee joint: A randomized control study.*International Journal of Yoga, 5*(1), 28. doi:10.4103/0973-6131.91708	Purpose: To study the effect of integrated yoga on pain, morning stiffness and anxiety in osteoarthritis of the knees. RQ: What is the effect of yoga on pain, morning stiffness, and anxiety in osteoarthritis of the knees?	Two hundred and fifty participants with OA knees (35-80 years) were randomly assigned to yoga or control group.	Design: One group has yoga exercises for 2 weeks while the other group had physiotherapy exercises. There was a 3 month follow up following this.	There was a greater decrease in pain scores among the yoga group than the control group.	This could be used in EBP to suggest yoga to aid in the decrease of pain related to RA	3 month follow up-could have been more long term.

Park, J., Mccaffrey, R., Newman, D., Cheung, C., & Hagen, D. (2014). The Effect of Sit 'N' Fit Chair Yoga Among Community-Dwelling Older Adults With Osteoarthritis. *Holistic Nursing Practice, 28*(4), 247-257. doi:10.1097/hnp.0000000000000034	Purpose: to examine the efficacy of Sit 'N' Fit Chair Yoga in improving the symptoms of OA in older adults who are not able to effectively participate in a more aggressive form of yoga or exercise. RQ: How effective is the use of Sit 'N' Fit Chair Yoga in improving the symptoms of OA in older adults who are unable to partake in more strenuous forms of exercise?	38 participants volunteered. All had to be without alzheimers. The study took place in florida and the participants were members of a senior center. The final number of participants was 29 due to participants dropping out.	Design: 29 participants were randomly assigned to either the control group or the experimental group and observed over the course of 8 weeks.	No significant improve-ments were noted between the two groups.	The results of this study raise questions as to whether or not this practice of yoga is actually effective in reducing OA symptoms in older adults.	The sample size for this study was fairly small. There was also an absence of significant findings

Sharma, M. Effects of a Yoga Intervention as a Supportive Therapy in Arthritis. *Yoga Studies* 2005:412–16.	Purpose: to examine the effects of a Social Cognitive Theory-based Kundalinî-Yoga intervention on arthritis patients.	A total of 24 participants, 23 women and one man, enrolled in the study from which 15 completed the course, ranging from 45 to 66 years of age.	The study, implemented through a wellness committee at the worksite of a Midwestern state health and human services department, included 6 weeks of 75-minute, Friday lunch-hour classes.	Even though the present study offers limited support, Yoga shows potential for use as a self-management supportive therapy in arthritis.	The present study offers limited support regarding the feasibility of Yoga for arthritis patients	There is a need for a larger sample size than 15 participants. Also, a greater variety in gender would strengthen the ability to generalize findings.

Stewart, A. (2013). Joint Ventures: Helping Those With Rheumatoid Arthritis Live Well. *International Journal of Yoga Therapy, 23*(2), 91-100. Retrieved October 30, 2016.	Purpose: To find out if yoga helps achieve symptom relief, regain function, and enhance quality of life for individuals with RA. RQ: does yoga help achieve symptom relief, regain function, and enhance quality of life for individuals with RA?	Four women with RA participated in private yoga therapy sessions for 2.5 months.	Assessment based, tailored home practices were developed and modified to address participant - identified goals.	Women showed improvement in pain and an increase in sense of well-being.	Could be used to argue that yoga can decrease pain in RA.	Very small sample size could make it inaccurate (only 4 people tested)

Telles, S., Naveen, K. V., Gaur, V., & Balkrishna, A. (2011). Effect of one week of yoga on function and severity in rheumatoid arthritis. *BMC Research Notes BMC Res Notes, 4*(1), 118. doi:10.1186/1756-0500-4-118	Purpose: to assess whether or not a week of yoga has an effect on the severity of rheumatoid arthritis RQ: Does yoga decrease the severity of rheumatoid arthritis?	64 participants with Rheumatoid arthritis enrolled in a one week yoga program.	The trial was a single group trial, with assessments before and after the one week intervention. All participants were administered the HAQ. Hand grip strength was measured using a standard method and a hydraulic hand grip dynamometer.	The group as a whole showed a significant decrease in the disability index.	This information could be used to prescribe the use of yoga to people with RA	This was a single group study with no control group. The group was also self-selected.

Ward, L., Stebbings, S., Cherkin, D., & Baxter, G. D. (2013). Yoga for Functional Ability, Pain and Psychosocial Outcomes in Musculoskeletal Conditions: A Systematic Review and Meta-Analysis. Musculoskeletal Care, 11(4), 203-217. doi:10.1002/msc.1042	Purpose: to assess the effectiveness of yoga on primary outcomes of functional ability, pain and psychosocial outcomes across a range of MSCs. RQ: How effective is yoga on the primary outcomes across a range of musculoskeletal conditions?	Seventeen studies met the inclusion criteria, involving 1,626 participants with low back pain (LBP), osteoarthritis (OA), rheumatoid arthritis (RA), kyphosis or fibromyalgia.	Studies were quality rated, and analysed for the effect of yoga on primary outcomes, immediately post-intervention.	The results showed that yoga did not appear to have a negative effect on RA, is acceptable and safe, and could reduce levels of pain.	This could be used to treat RA by suggesting yoga to a patient.	Only 12 of the studies had a good quality rating.